

Embolization for Multicompartmental Bleeding in Patients in Hemodynamically Unstable Condition: Prognostic Factors and Outcome

Pierre E. Bize, MD, Rafael Duran, MD, David C. Madoff, MD, Nadège Golliet-Mercier, MD, Catherine Heim, MD, Frank Pilleul, MD, Nicolas Demartines, MD, and Alban Denys, MD

ABSTRACT

Purpose: To determine prognostic factors and evaluate outcomes of transcatheter arterial embolization in severely injured patients in hemodynamically unstable condition with multicompartmental bleeding.

Materials and Methods: Between June 2000 and May 2008, 36 consecutive patients treated with transcatheter arterial embolization for major retroperitoneal bleeding associated with at least one additional source of bleeding were retrospectively reviewed. Mean Injury Severity Score (ISS) was 49.4 ± 15.8 . Univariate and multivariate analyses were performed to identify parameters associated with failure of embolization, need for additional surgery to control bleeding, and fatal outcome at 30 d.

Results: Embolization was technically successful in 35 of 36 patients (97.2%) and resulted in immediate and sustained (> 24 h) hemodynamic improvement in 29 (80.5%). Additional hemostatic surgery was necessary after embolization in six patients (16.6%). Fifteen patients (41.6%) died within 30 d. Failure to restore hemodynamic stability was correlated with the rate of administration of packed red blood cells ($P = .014$), rate of administration of fresh frozen plasma (FFP; $P = .031$), and systolic blood pressure (SBP) immediately before embolization ($P = .002$). The need for additional surgery was correlated with FFP administration rate before embolization ($P = .0002$) and hemodynamic success ($P = .003$). Death was correlated with Glasgow Coma Scale score at admission ($P = .001$), ISS ($P = .014$), New Injury Severity Score ($P = .016$), number of injured sites ($P = .012$), SBP before embolization ($P = .042$), need for vasopressive drugs before embolization ($P = .037$), and hemodynamic success ($P = .0004$).

Conclusions: In patients in hemodynamically unstable condition, transcatheter arterial embolization effectively controls bleeding and improves hemodynamic stability. Immediate survival is related to hemodynamic condition before embolization, and 30-d mortality is mainly related to associated brain trauma.

ABBREVIATIONS

AAST = American Association for the Surgery of Trauma, ACS = abdominal compartment syndrome, FAST = Focused Assessment by Sonography for Trauma, FFP = fresh frozen plasma, HIS = Hemodynamic Instability Score, ISS = Injury Severity Score, NISS = New Injury Severity Score, PRBC = packed red blood cell, SBP = systolic blood pressure

Transcatheter arterial embolization has become an accepted treatment option for traumatic abdominal solid-organ injuries such as to the spleen or liver (1–5). It is also useful in patients with pelvic or renal trauma (5–11). In experienced hands, transcatheter arterial embolization has many theoretical advantages. It can rapidly treat multiple and anatom-

ically distant bleeding sites from a single arterial access, thereby preventing further blood loss and reducing the risk of hypothermia. In cases of retroperitoneal bleeding, transcatheter arterial embolization has the advantage of maintaining the natural tamponade effect exerted by the hematoma at the site of injury (6,8,12). Transcatheter arterial

From the Departments of Diagnostic and Interventional Radiology (P.E.B., R.D., A.D.), Department of Anesthesiology (C.H.), and Visceral Surgery (N.D.), University Hospital of Lausanne, Vaud 1011, Lausanne, Switzerland; Department of Diagnostic and Interventional Radiology (D.C.M.), New York Presbyterian Hospital, Weill Cornell Medical Center, New York, New York; and Department of Radiology (N.G.-M., F.P.), University Hospital Edouard Herriot, Lyon, France. Received October 14, 2011; final revision received February 15, 2012; accepted February 18, 2012. Address correspondence to P.B.; E-mail: pierre.bize@chuv.ch

None of the authors have identified a conflict of interest.

This article includes figures and tables that are available online only at www.jvir.org.

© SIR, 2012

J Vasc Interv Radiol 2012; 23:751–760

DOI: 10.1016/j.jvir.2012.02.009

Table 1. Modified Hemodynamic Instability Score as Proposed in 2008 by the Western Trauma Association (16)

Grade	Description
0	No significant hypotension (systolic blood pressure < 90 mm Hg) or serious tachycardia (heart rate > 130 beats/min)
1	Hypotension or tachycardia by report but none recorded in the emergency department
2	Hypotension or tachycardia responsive to initial volume loading with no ongoing fluid or RBC requirement
3	Hypotension or tachycardia responsive to initial volume loading with modest ongoing fluid (< 250 mL/h) or RBC requirement
4	Hypotension or tachycardia only responsive to > 2 L of volume loading the need for vigorous ongoing fluid infusion (> 250 mL/h) and RBC transfusion
5	Hypotension unresponsive to fluid and RBC transfusion

Note.—RBC = red blood cell.

embolization can even be performed in the presence of coagulopathy, which frequently occurs in polytrauma cases.

Until recently, transcatheter arterial embolization was indicated only in patients with stable hemodynamic characteristics. Although patients in unstable hemodynamic condition were and are still usually treated surgically, surgical management of patients in unstable condition with multiple bleeding sites remains a major challenge. Many treatment options have been reported, such as pelvic stabilization, “damage control” surgery, and immediate reparative surgery. Damage control surgery is an abbreviated laparotomy that includes abdominal packing to limit blood loss without attempting to repair the damaged organ. Immediate surgical repair is a more complex procedure with the goal to control bleeding and repair the damaged organ in the same session.

Nevertheless, some authors have recently shown that transcatheter arterial embolization can be a successful alternative in patients with marginally stable hemodynamic characteristics (13,14). With a lack of prospective randomized trials, a recent metaanalysis (15) failed to show that any of the approaches were better than the others, and there are no validated guidelines for the surgical management of these critically injured patients to date. Therefore, the purpose of the present retrospective study was to evaluate the efficacy of transcatheter arterial embolization in a subset of patients with severe polytraumatic injury presenting with major retroperitoneal bleeding associated with at least one other source of bleeding and impaired hemodynamic function, and to compare the results of transcatheter arterial embolization with those of damage control surgery in the same subset of patients. We also investigated the clinical factors associated with the failure of transcatheter arterial embolization, the need for surgical management, and fatal outcome.

MATERIALS AND METHODS

This retrospective study was approved by the local ethics committee, and a waiver for informed consent was obtained. Clinical and radiologic data were reviewed retrospectively from a prospective trauma registry, radiologic reports, and patient hospital charts. Relevant data were

entered into a database on FileMaker Pro 9 software (FileMaker, Santa Clara, California).

Inclusion criteria were the following: polytrauma with hemodynamic instability, multiple bleeding sites, and treatment with transcatheter arterial embolization. Hemodynamic status was based on the Western Trauma Association Hemodynamic Instability Score (HIS; **Table 1**) (16). Patients with an HIS of at least 3 during transcatheter arterial embolization were considered to be in hemodynamically unstable condition. Between June 2000 and May 2008, 247 trauma patients were treated by transcatheter arterial embolization in two tertiary trauma centers with expertise in treating hemorrhagic lesions of the liver, spleen, or kidneys, and retroperitoneal vascular lesions. Thirty-six of these patients (24 men, 12 women; mean age, 41 y \pm 19.5; range, 13–83 y) presented with multicompartmental bleeding confirmed by multidetector computed tomography (CT). Multicompartmental bleeding was defined as the association of major retroperitoneal bleeding and at least one other source of bleeding, such as an intraperitoneal organ, the chest, maxillofacial area, or limbs. Trauma resulted from falling from a height (n = 20), motor vehicle accident (n = 14), and work-related or recreational accidents (n = 2). Fourteen patients had systolic blood pressure (SBP) lower than 90 mm Hg (mean, 58.9 mm Hg \pm 32.8) on admission and did not show a response to initial fluid resuscitation. Twenty-two patients had SBP of at least 90 mm Hg (mean, 121.6 mm Hg \pm 22.5); 20 were considered to show a transient response to fluid resuscitation and two were considered to be in hemodynamically stable condition. The hemodynamic status of patients at the moment of embolization was based on HIS (**Table 1**) (16). All patients underwent aggressive resuscitation with intravenous fluids immediately after evaluation on site. A pelvic strap was placed on all patients to limit bleeding from pelvic injuries.

Patients were initially evaluated in the emergency room by using Focused Assessment by Sonography for Trauma (FAST) examination and underwent chest and pelvic radiography according to Advanced Trauma Life Support guidelines (17). Two patients in hemodynamically unstable condition with positive findings on FAST examination were taken to the operating room before multidetector CT could be performed. Thirty-four patients were eval-

Download English Version:

<https://daneshyari.com/en/article/4238875>

Download Persian Version:

<https://daneshyari.com/article/4238875>

[Daneshyari.com](https://daneshyari.com)